

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P18735PC00/sko	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/NO2004/000247	International filing date (day/month/year) 13.08.2004	Priority date (day/month/year) 15.08.2003	
International Patent Classification (IPC) or national classification and IPC B27K3/15			
Applicant WOOD POLYMER TECHNOLOGIES ASA et al.			

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. (*sent to the applicant and to the International Bureau*) a total of 3 sheets, as follows:
 - sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. (*sent to the International Bureau only*) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

Date of submission of the demand 15.06.2005	Date of completion of this report 08.11.2005
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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
 international search (under Rules 12.3 and 23.1(b))
 publication of the international application (under Rule 12.4)
 international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-11 as originally filed

Claims, Numbers

1-30 received on 18.07.2005 with letter of 12.07.2005

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. The amendments have resulted in the cancellation of:

- the description, pages
 the claims, Nos.
 the drawings, sheets/figs
 the sequence listing (*specify*):
 any table(s) related to sequence listing (*specify*):

4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- the description, pages
 the claims, Nos.
 the drawings, sheets/figs
 the sequence listing (*specify*):
 any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1*, 2-30
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-30
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-30
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

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The documents cited in the search report are referred to in the present communication numbered D1-D5 in the order of appearance in the search report.

1. The present application relates to a composition comprising furfuryl alcohol, styrene and initiator and a method of producing such. Although it is clear from the description that the aim is to treat wood using the composition, whereby various advantages can be obtained, the independent claims are essentially not restricted to any particular use. A mere statement "wood treating composition" is only limiting to the extent that the composition be "suitable" for such use.
 - 1.1 It appears that each type of monomer requires a separate initiator to obtain the desired effects. In the present wording of claim 1 it is the nature of the initiator(s) not evident and whether for instance only one initiator can be used. These essential features should be present in the independent claims (R. 6.3(a) PCT, Art. 6 and Art. 33(3) PCT).
 - 1.2 Furthermore, it is indicated as essential in the description that the compositions are mixed in a certain order to be usable for the intended purpose [vide page 3, lines 1-14] (Art. 5 and 6 PCT). Also this essential feature is lacking from independent claim 1 defining a composition per se (R. 6.3(a) and Art. 33(3) PCT). If it is evident from the composition per se whether it was mixed in a certain order, it would seem sensible to word the claim as a product-by-process claim referring to claim 14, i.e. "A wood treating composition comprising and being obtainable according to the method of claim 14".
 - 1.3 Several of the composition claims 1-13 make reference to the "first" and "second solution". It is unclear how it can be determined from an arbitrary composition according to claim 1 whether a certain component was in fact present in said "first" or "second solution" (Art. 6 PCT).
2. It is known to combine compositions comprising styrene and furfuryl alcohol [vide e.g. D1 and D2]. D1 even suggests that a wood material can be impregnated with first a

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styrene containing composition and then a furfuryl containing composition both comprising high relative amounts of (the same) initiator (see item 1.1. above) followed by polymerisation. Any particular combined effect of the monomers seem not contemplated in D1.

- 2.1 Although D1 operates with two independent treatment compositions, in theory a combined "wood treating formulation" will inherently be created within the wood treated with said two compositions and strictly formal lack of novelty of claim 1 over D1 could in principle be argued (Art. 33(2) PCT).
- 2.2 However, as such "formulation" in view of the description evidently is not what is contemplated by the applicant, the novelty objection has not been raised, but rather an objection for lack of clarity (Art. 6 PCT) and lack of essential features (R. 6.3a PCT) [vide items 1-1.3 above].
3. Apart from D5, which is published after the priority date of the present application and thus does not form citable prior art for the purpose of the International Preliminary examination, none of the cited documents disclose or suggest that certain advantages can be obtained by treating wood with a mixture containing furfuryl alcohol and styrene when these monomers are mixed in a certain order with their respective initiators which are present in certain amounts.
- 3.1 It is noted that D2 appears to imply the combination of furfuryl alcohol and styrene mere at random [vide claim 3] and cannot be seen to provide any explicit teaching that such combination can provide any particular advantages in particular not as a wood treatment composition.
- 3.2 Accordingly it appears that in particular for appropriately delimited and clarified claims both novelty and inventive step can be acknowledged (Art. 33(2) and (3) PCT).
4. Industrial applicability is inherent (Art. 33(4) PCT).

CLAIMS

1. A wood treating formulation, characterized in that the formulation is a mixture of a first solution containing styrene and an initiator, said initiator being present in amount of about 1% or greater based on styrene, and a second solution containing furfuryl alcohol and an initiator, said initiator being present in an amount of about 5% or greater based on furfuryl alcohol.
2. The wood treating formulation of claim 1, characterized in that the first solution further comprises a crosslinker.
3. The wood treating formulation of claim 2, characterized in that the initiators of the first solution are a combination of 2,2'-azobis(2-methylbutane-nitrile), 1,1'-azobis(cyclohexane-carbonitrile) and tertiary butyl perbenzoate.
4. The wood treating formulation of claim 2, characterized in that the crosslinker of the first solution is divinyl benzene.
5. The wood treating formulation of claim 2, characterized in that a mineral oil or wax optionally is present in the first solution as an extender.
6. The wood treating formulation of claim 2, characterized in that the initiator of the second solution is maleic anhydride.
7. The wood treating formulation of claim 3, characterized in that about 0,3% of 2,2'-azobis(2-methylbutane-nitrile) based on styrene is present in the first solution.
8. The wood treating formulation of claim 3, characterized in that about 0,4% of 1,1'-azobis(cyclohexane-carbonitrile) based on styrene is present in the first solution.
9. The wood treating formulation of claim 3, characterized in that about 0,5% of tertiary butyl perbenzoate based on styrene is present in the first solution.
10. The wood treating formulation of claim 4, characterized in that about 3,5% of divinyl benzene based on styrene is present in the first solution.
11. The wood treating formulation of claim 5, characterized in that 0 to 30% of mineral oil or wax based on styrene is present in the first solution.
- 30 12. The wood treating formulation of claim 1, characterized in that 10 to 30% of furfuryl alcohol, which is based on the styrene of the first solution, is present in the second solution.

13. The wood treating formulation of claim 6, characterized in that 5 to 10% of maleic anhydride based on furfuryl alcohol is present in the second solution.
- 5 14. A process for producing a wood treating formulation, characterized in that the formulation is produced by preparing a first solution containing styrene and an initiator, said initiator being present in amount of about 1% or greater based on styrene, preparing a second solution containing furfuryl alcohol and an initiator, said initiator being present in an amount of about 5% or greater based on furfuryl alcohol, and thereafter combining the two solutions.
- 10 15. The process of claim 14, characterized in that the first solution is prepared by dissolving initiators and a crosslinker in the styrene, and the second solution is prepared by dissolving an initiator in the furfuryl alcohol.
- 15 16. The process of claim 15, characterized in that the initiators of the first solution are selected from a combination of 2,2'-azobis(2-methylbutane-nitrile), 1,1'-azobis(cyclohexane-carbonitrile) and tertiary butyl perbenzoate.
17. The process of claim 15, characterized in that the crosslinker of the first solution is divinyl benzene.
- 20 18. The process of claim 15, characterized in that a mineral oil or wax optionally is present in the first solution as an extender.
19. The process of claim 15, characterized in that the initiator of the second solution is maleic anhydride.
- 25 20. The process of claim 16, characterized in that about 0,3% of 2,2'-azobis(2-methylbutane-nitrile) based on styrene is present in the first solution.
21. The process of claim 16, characterized in that about 0,4% of 1,1'-azobis(cyanocyclohexane-carbonitrile) based on styrene is present in the first solution.
22. The process of claim 16, characterized in that about 0,5% of tertiary butyl perbenzoate based on styrene is present in the first solution.
- 30 23. The process of claim 17, characterized in that about 3,5% of divinyl benzene based on styrene is present in the first solution.
24. The process of claim 18, characterized in that 0 to 30% of mineral oil or wax based on styrene is present in the first solution.
- 35 25. The process of claim 14, characterized in that 10 to 30% of furfuryl alcohol, which is based on the styrene of the first solution, is present in the second solution.

26. The process of claim 19, characterized in that 5 to 10% of maleic anhydride based on furfuryl alcohol is present in the second solution.
27. The process of claim 14, characterized in that the wood treating solution is impregnated by immersing wood in the formulation and applying a vacuum and pressure cycle to force the formulation into the wood.
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28. The process of claim 14, characterized in that curing of the treating formulation impregnated in the wood is carried out by heating.
29. The process of claim 28, characterized in that polymerization is carried out by heating the impregnated wood sufficiently for it to reach 80 C in the center.
- 10 30. The process of claim 28, characterized in that finishing polymerization for products where odour must be kept to a minimum is carried out by heating the impregnated wood sufficiently for it to reach 120 C in the center for at least one hour.